

fusc-olivacea, concentrice plicato-striata, disco medio et postico rugis obliquis irregulariter angulatis, interdum granosis, hic illic præsertim versus marginem ventralem obsolete corrugato; umbo-nibus non prominentibus, subplanulatis, angulatim corrugatis, haud procul ab extremitate anteriore positis; lunella parva, concava; latere antico brevissimo subacuminato-rotundato; area convexa; margine dorsali postice regulariter convexo-curvato, terminaliter rotundato, ventrali convexo; dentibus cardinalibus crassis, radiatim corrugatis, in valva dextra binis, anteriore minimo, in sinistra ternis vel subternis; lateralibus elongatis subcurvatis, in valva dextra subduplicibus, in sinistra duplicibus; margarita colore salmonis tincta. Testa junior rotundato-ovalis, omnino præter ad extremitatem anticam subradiatim granoso-plicifera.

	1.	2.	3 (Testa junior).
Long.	52	45	34
Lat.	35	32	26½
Crass.	22	20	17
Ligamenti long.	23	20½	16

Hab. in flumine Iravadi ad Bhamo in regno Avæ.

I know of no *Unio* with which I can compare this. *U. pellis lacerti*, Mor., from Siam, is a little like it, but is much narrower and less inequivalve.

Several other species of *Unio* occurring with *U. burmanus* appear to me to be rather varieties of named species than forms deserving a distinct name. In one or two cases I feel doubtful, however. All would unquestionably be described as new by many naturalists. It is worthy of note that some of them are more closely allied to forms occurring in the Brahmapooter river, in Assam, than to those inhabiting the lower Irawady valley, in Pegu. The land shells of Bhamo and its neighbourhood are mostly either identical with forms occurring in Cachar and Khasia, or closely allied to them; and it is a remarkable and interesting fact connected with freshwater shells to find that they coincide in their distribution with the land animals, and do not follow the lines of the rivers in which they live, thus adding another proof of the existence of a means of migration amongst them independent of the course of rivers.

7. Notes on the Myology of *Menobranchnus lateralis*. By ST. GEORGE MIVART, F.R.S., Lecturer on Comparative Anatomy at St. Mary's Hospital.

The specimen which has served me for examination is one of those mentioned in my paper on *Menopoma* as having been confided to me from the stores of the Royal College of Surgeons.

This well-known species with permanent external gills has a more slender form than *Menopoma*; it has also a narrower head and

muzzle, and is destitute of the lateral folds of skin; but the tail has a cutaneous fin both above and below, extending further forwards, inferiorly, than in the last-named genus.

The skin is smooth and devoid of transverse wrinkles. A deep fold passes across the underside of the throat, as in the larvæ of other Batrachians.

The rounded cloacal aperture is placed very much behind the origins of the pelvic limbs.

The forearm and leg are respectively but little shorter than the arm and thigh, and the pectoral and pelvic limbs are widely separated.

The posterior digits are not broadened by cutaneous folds.

The gape of the mouth only extends backward to about the eye, though it appears from the fold of the lips to recede further.

The head is flat, the eyes destitute of eyelids, and a longitudinal groove runs along the middle of the back.

Dimensions.

	inches.
Extreme length from muzzle to tail-end	11·00
Length from mandibular symphysis to middle point between the arm-pits	2·16
Length from the said middle point to anterior end of cloaca	5·34
Length from cloaca to end of tail	3·25
Length of head about	1·30
Breadth of head	1·19
Vertical thickness of head	·53
Vertical thickness of mid-body about	·96
Greatest breadth of body	1·07
Transverse diameter of tail at about its mid-length . .	·33
Vertical extent of tail at the same place	1·00
Distance between the eyes	·57
Extreme length of pectoral limb	1·27
Extreme length of pelvic limb	1·47
Distance from mid-point between the eyes to the end of the muzzle	·40
Distance between the origins of the pectoral and pelvic limbs of one side	4·51
Distance of the origin of the pectoral limb from the mandibular symphysis	2·12
Distance of the origin of the pectoral limb from the end of the tail	4·07

Proportions.

Length of head compared with its breadth at 100	109·2
Height of head compared with its breadth at 100	44·5
Length of body (from pectoral girdle to cloaca) compared with its breadth at 100	499·0

	inches.
Breadth of mid-tail to its height at 100	33·0
Height of body to length from pelvic girdle to cloaca at 100	17·9
Length of tail to the same	60·8
Length of pectoral limb to the same	23·7
Length of pelvic to the same	27·5

MYOLOGY.

As in *Menopoma*, so in *Menobranchus*, the general muscular investment of the body may be divided into four longitudinal portions separated by four more or less marked antero-posteriorly directed lines of demarcation.

Each of the longitudinal muscular masses is more or less clearly divided and cut up by transverse tendinous intersections, which are most marked in the hinder part of the body and the anterior part of the tail.

Of the four lines of demarcation, only the dorsal one is much marked in the trunk. This extends from the mid-cranial region to the end of the tail; and above the caudal portion of it is a mass of fatty bodies which fill up the dorsal caudal fin. A similar mass fills up the ventral caudal fin and the caudal part of the ventral line of demarcation, almost as far forwards as the cloacal aperture. Immediately in front of that aperture, and extending thence forwards to the hinder margin of the pelvis, a very large thick glandular cushion is interposed, separating the longitudinal muscular masses more widely than they are separated in any other part of the body. In front of the pelvis the ventral line of demarcation is formed by the but-little-marked *linea alba*.

The lateral lines of demarcation extend from the throat to the end of the tail; and the anterior end of the furrow widens into the gap, out of which the branchial arches protrude. In the trunk this linear division is situated rather above the middle (vertically) of the side of the body. In the tail it passes along the middle, each dorso-lateral caudal muscular mass being about equal in extent to each ventro-lateral caudal muscular mass.

Each dorso-lateral muscular mass extends from the upper surface of the skull to the distal end of the dorsum of the tail, investing the transverse processes, neural arches, and spines of the vertebræ and ribs, but having no direct connexion with the pectoral and pelvic arches. It is a continuous thick fleshy mass, not differentiated into distinct muscles. Its fibres are all antero-posteriorly directed.

Each ventral portion of the lateral muscular mass (*i. e.* the part between the lateral linear groove and the *linea alba* and the caudal continuation of that part) extends from the urohyal to the end of the ventral portion of the tail, interrupted, however, by the pelvis and by the interposed large glandular cushion behind it.

As in *Menopoma*, the trunk portion of the ventral lateral mass,

but not its caudal portion, consists of distinct muscular layers superimposed.

MUSCLES OF THE TRUNK.

The *external oblique* (figs. 3, 4, 8, 9 & 10, *Ex. O*). The fibres of this muscle extend obliquely backwards and downwards; and the muscle itself forms a sheet of such fibres, which extends from the lateral furrow nearly to the ventral middle line of the body, and from the shoulder to the pelvis. Towards the tail it seems to unite indistinguishably with the internal oblique.

The *internal oblique*. This (as in *Menopoma*) is the largest muscle of the body, extending, as one may say, from the urohyal to the tail's end. The fasciculi of fibres are rather large and coarse, and extend from one tendinous intersection to another. The direction of the fibres is forwards and downwards. The muscle is partly inserted into the ilium and its rib; but some fibres pass beneath these hard parts, and the muscle is so continued on into the tail. Towards its anterior insertion this muscle appears to fuse with the rectus (which is superficial to it), and to constitute a sterno-hyoid (figs. 4 & 5, *S. H*).

The *transversalis* is a delicate muscular layer, extending from the region of the heart backwards to a little behind the pelvis.

Rectus (fig. 4, *R*). This muscle is very delicate and thin in the abdominal region; towards the pectoral arch and in front of it it is thicker, and covers externally the internal oblique, with which it appears to fuse, when they pass forwards as the sterno-hyoid (figs. 4 & 5, *S. II*) to its insertion into the urohyal. This muscle may be regarded as continued on even to the mandibular symphysis by means of the genio-hyoid (fig. 4, *G. H*).

Retrahentes costarum. The muscular fibres I thus name run backwards on each side of the spine, being applied to the under surfaces of the bodies and transverse processes of the vertebrae. They extend from beneath the head to the pelvic region, but do not go on into the tail.

MUSCLES OF THE HEAD.

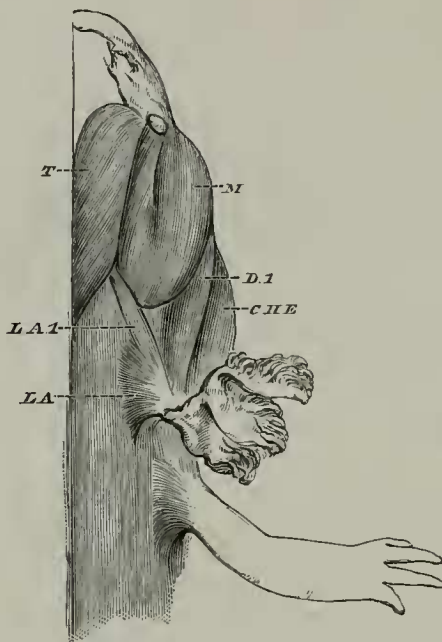
Temporalis (figs. 1, 2, & 3, *T*). This muscle arises from the middle of the upper surface of the skull, and (by fascia) from the first neural spine, also from the dorsum of the pterygoid and of the small bone extending outwards* in front of the suspensorium and above the pterygoid. From this extensive origin (reaching forwards a little in front of the eyeballs) the fibres converge, and are inserted, by a strong tendon, into the summit of the mandible, just in front of its articulation with the quadratum. Its insertion is posterior and somewhat internal to the insertion of the tendon of the masseter.

Pterygoid. I do not find this muscle distinct from the temporal.

* See 'Ontleed en dierkundige Bijdragen tot de Kennis van *Menobanchus*,' by J. Van der Hoeven (Leyden, 1867). pl. ii. fig. 4, *i*.

The two appear to form but one, which arises in part (as has been said) from the dorsum of the pterygoid.

Fig. 1.



Superficial muscles of right side of head and of anterior part of trunk.

C. H. E. Cerato-hyoideus externus. *D. 1.* First part of digastric. *L. A.* Levatores arcuum. *L. A. 1.* Most anterior part of the same. *M.* Masseter. *T.* Temporalis.

The *masseter** (figs. 1, 2, & 3, *M*) is an exceedingly thick muscle, which is more or less divisible into a larger outer portion and a smaller inner part, the fibres being inserted into the tendon (which appears towards the lower part of the muscle) in a somewhat peniform manner. The muscle arises (between the temporal and digastric) from the antero-superior surface of the suspensorium, and is implanted, by its tendon, into the outer side of the mandible towards its upper border and in front of the insertion of the tendon of the temporalis.

The *digastric*† (figs. 1, 2, & 3, *D. 1* & *D. 2*) is also a considerable muscular mass, and springs from different origins; it is inserted by a strong tendon into the posterior extremity of the mandibular ramus. This strong tendon also connects the dorsal end of the hyoidean cornu with the posterior extremity of the mandible.

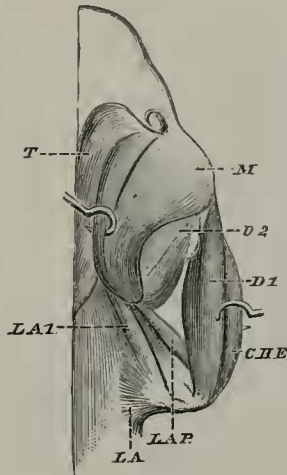
The muscle appears to me to consist of two parts. One of these springs from the outer surface of the suspensorium, the origin ex-

* Fischer, 'Anatomische Abhandlungen über die Perennibranchiaten und Derotremen' (Hamburg, 1864), p. 59, tab. iii. B. *m*.

† Fischer, *l. c.* p. 50, tab. iii. B. *dg'*.

tending from the extreme end of the opisthotic forwards and downwards to the distal end of the quadratum (fig. 2, *D. 2*). This portion is entirely hidden until either the masseter is drawn forwards or the digastric backwards.

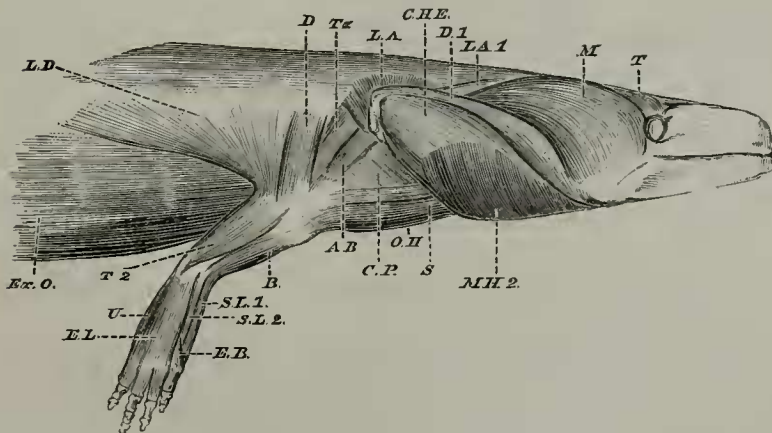
Fig. 2.



Deeper muscles of right side of head, the *masseter* being drawn forwards and inwards, the first part of the *digastric* outwards.

C. H. E. Cerato-hyoideus externus. *D. 1.* First part of digastric. *D. 2.* Second part of digastric. *L. A.* Levatores arcuum. *L. A. 1.* Most anterior part of the same. *L. A. P.* Levator arcus primi. *M.* Masseter. *T.* Temporalis.

Fig. 3.



Superficial muscles of right side and of extensor surface of right pectoral limb.

A. B. Adductor branchiarum. *B.* Biceps. *C. P.* Constrictor pharyngis. *C. H. E.* Cerato-hyoideus externus. *D.* Deltoid. *D. 1.* First part of digastric. *E. B.* Extensor brevis. *E. L.* Extensor longus. *Ex. O.* External oblique. *L. A.* Levatores arcuum. *L. A. 1.* First part of the same. *L. D.* Latisimus dorsi. *M.* Masseter. *M. H. 2.* Mylo-hyoideus posterior. *O. H.* Omo-hyoid. *S.* Subclavius. *S. L. 1* & *S. L. 2.* Supinator longus. *T.* Temporalis. *Tz.* Trapezius. *T. 2.* Triceps. *U.* Ulnaris.

The other part of the digastric (figs. 1, 2, & 3, *D. 1*) is larger, and springs from the dorsal end of the first branchial arch (above the attachment of the levator arcus primi), and is inserted behind the first part into the tendon before mentioned.

*Levatores arcuum** (figs. 1, 2, & 3, *L. A.* & *L. A. 1*, also fig. 2, *L. A. P*). These are much developed, and the one going to the first branchial arch is remarkably distinct from the rest. This, the *levator arcus primi* (fig. 2, *L. A. P*), is quite hidden until the digastric is pulled outwards and the anterior part of the dorso-lateral muscular mass inwards towards the middle line. When this is done the *levator arcus primi* is to be seen passing outwards and backwards from the exoccipital and opisthotic to the anterior margin of the first branchial arch, very near its superior extremity.

The *levatores** of the second and third branchial arches arise mainly from the dorsal fascia; but the most anterior part (figs. 1 & 2, *L. A. 1*) seems to be differentiated off from the anterior end of the dorso-lateral muscular mass, and covers, and is similar in direction to, the hidden levator arcus primi. In the figure, between the most anterior part (fig. 1, *L. A. 1*) and the first part of the digastric (fig. 1, *D. 1*) a portion of the anterior end of the dorso-lateral muscular mass is seen to be interposed.

Mylo-hyoideus anterior† (figs. 4 & 5, *M. H. 1*). This muscle is relatively smaller than is its homologue in *Menopoma*. It arises from the inside and lower border of the ramus of the mandible, and unites with its fellow of the opposite side without forming any distinct longitudinal tendinous interval.

The *mylo-hyoideus posterior*‡ (figs. 3, 4, & 5, *M. H. 2*) is a considerable muscle, the postero-inferior part of which is enclosed on both sides by the skin forming a free fold or opercular flap beneath the throat. The muscle arises from the dorsal segments of the hyoidean cornu and first branchial arch, also from the fascia investing externally the voluminous cerato-hyoideus externus. Passing downwards it unites with its fellow of the opposite side, a sort of linea alba marking their junction. At its anterior part this muscle is placed above the mylo-hyoideus anterior, the latter being superficial to it.

I could find no trace of the muscle which I have described in *Menopoma* as the constrictor faucium.

Constrictor pharyngis§. This consists of two parts: one (the *dorso-trachealis*) arises from the fascia external to the dorso-lateral muscular mass behind and beneath the levatores arcuum; the other (the *hyo-trachealis*) springs from the postero-ventral surface of the third branchial arch. The fibres converge and join the fellow muscle of the opposite side beneath the trachea.

The *genio-hyoideus*|| (fig. 4, *G. II*) is a rather long narrow muscle

* Fischer, *l. c.* p. 81, tab. iii. v. *la.*

† Fischer, *l. c.* p. 42.

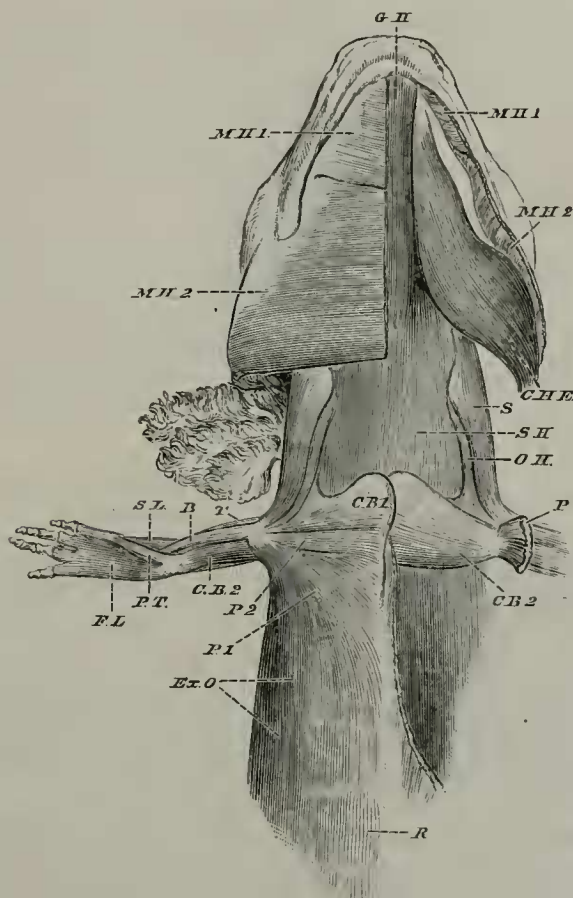
‡ Fischer, *l. c.* p. 55.

† Fischer, *l. c.* p. 41.

§ Fischer, *l. c.* p. 89.

which runs beside its fellow of the opposite side from its origin, the urohyal, forwards to the mandibular symphysis.

Fig. 4.



Muscles of ventral surface: on the right side superficial muscles; on the left side deeper muscles, the *mylo-hyoidei*, *pectoralis*, and *external oblique* being removed. Also superficial flexor muscles of right pectoral limb.

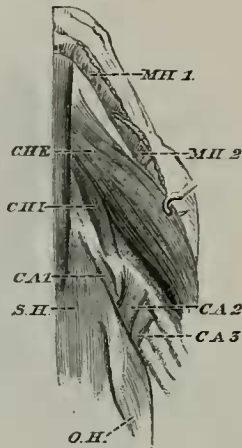
B. Biceps. *C.B.1* & *C.B.2*. Coraco-brachialis. *C.H.E.* Cerato-hyoideus externus. *Ex.O.* External oblique. *F.L.* Flexor longus. *G.H.* Genio-hyoid. *M.H.1* & *M.H.2*. Mylo-hyoideus. *O.H.* Omo-hyoid. *P.*, *P.1*, & *P.2*. Pectoralis. *S.* Subclavius. *S.H.* Sterno-hyoid. *S.L.* Supinator longus. *T.* Triceps.

*Cerato-hyoideus externus** (figs. 1, 2, 3, 4, & 5, *C.H.E.*). A very voluminous muscle, springing from the whole under surface and anterior part of the inner surface of the hyoidean cornu. Passing

* Fischer, *l.c.* p. 68.

backwards, it is inserted into the outside of the dorsal part of the first branchial arch, immediately beneath the insertion of the second part of the digastric.

Fig. 5.



Deepest muscles of left side of ventral surface of head, the *cerato-hyoideus externus* being drawn strongly forwards.

C. A. 1, *C. A. 2*, & *C. A. 3*. *Constrictores arcuum*. *C. H. E.* *Cerato-hyoideus externus*. *C. H. I.* *Cerato-hyoideus internus*. *M. H. 1* & *M. H. 2*. *Mylo-hyoideus*. *S. H.* *Sterno-hyoid*.

*Cerato-hyoideus internus** (fig. 5, *C. H. I.*). A very much smaller muscle than the last, and, as Fischer says, "spindle-shaped and tendinous at each end." It arises from the inner end of the posterior surface of the hyoidean cornu, and is inserted into the lower end of the dorsal segment of the first branchial arch.

Constrictores arcuum† (fig. 5, *C. A. 1*, *C. A. 2*, and *C. A. 3*). There are three of these small muscles. The first connects the ventral end of the second branchial arch with the dorsal end of the ventral segment of the first branchial arch. The second and largest of the three connects together the ventral ends of the dorsal segments of the first and third branchial arches. The third muscle connects together the ventral ends of the dorsal segments of the second and third branchial arches.

A muscle‡ (figs. 4 & 5, *S. H.*), which corresponds to the *sterno-hyoideus* of *Menopoma*, though here there is no sternum, and is in fact the anterior continuation of the rectus, passes forwards and is inserted into the dorsal surface of the urohyal and into the ventral surface of the ventral segment of each first branchial arch, near its junction with the basihyal.

* Fischer, *l. c.* p. 72, tab. i. fig. 4, *pa.*

† Fischer, *l. c.* p. 74, tab. i. fig. 3, *ca* and *ca'*.

‡ Fischer, *l. c.* p. 104.

Omo-hyoideus (figs. 3, 4, & 5, *O. H.*). This elongated muscle arises from the inner and upper side of the precoracoid cartilage, and passes thence forwards to between the urohyal and first branchial arch.

*Genio-glossus**. This small muscle arises, on each side, from the posterior surface of the mandibular symphysis, and thence passes outwards and backwards to be inserted into the skin of the mouth.

The *levatores branchiarum*† are small muscles which pass downwards from the dorsum of each branchial arch respectively to the dorsum of each gill-tuft.

The *depressores branchiarum*‡ go from the ventral surface of each branchial arch to the ventral surface of each gill-tuft respectively.

Of the *adductores branchiarum*§, the first goes from the dorsal end of the second branchial arch to the first gill-tuft; the second similarly from the third branchial arch to the second gill-tuft; the third, long and delicate (fig. 3, *A. B.*), extends from the angle between the precoracoid and scapular cartilages forwards to the root of the third gill-tuft and dorsal part of the last branchial arch.

APPENDICULAR MUSCLES.

Pectoral Limb.

Trapezius (fig. 3, *Tz*). This is an exceedingly small muscle, which is placed immediately behind the third adductor branchiarum and levatores arcuum. It arises from the fascia investing the dorsal muscle, and is inserted into the lower half of the anterior margin of the scapula down to its junction with the precoracoid cartilage.

The *latissimus dorsi* (fig. 3, *L. D*) is more than twice the size of the trapezius. It arises from the fascia, and ends by coalescing with the upper part of the triceps.

The *pectoralis* (fig. 4, *P. 1* & *P. 2*) is a considerable muscle which arises partly from one of the tendinous intersections of the rectus, partly from a raphe separating it from its fellow of the opposite side, and partly from the under surface of the posterior part of the coracoid cartilage towards and at its inner margin. It is inserted into the lowest part of the crest of the humerus, immediately above the origin of the biceps. The part arising from the coracoid (*P. 2*) is slightly separated from the larger and more posteriorly arising portion (*P. 1*).

Serratus magnus. This is a thin small muscle springing from the side of the lateral muscular mass beneath the latissimus dorsi. It is inserted into the inner side of the upper part of the scapula.

The *levator anguli scapulae* is a very long and slender muscle.

* Fischer, *l. c.* p. 67.

† Fischer, *l. c.* p. 38, and tab. iii. *b, b', b'', b'''*.

‡ *L. c.* p. 39, and tab. i. fig. 1. *db', db'', db'''*.

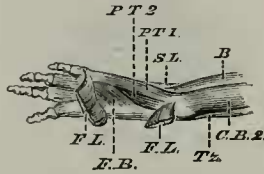
§ *L. c.* p. 39.

It arises from the occiput, and is inserted into the inner side of the dorsum of the scapula, being conterminous with the insertion of the serratus magnus.

The *omo-hyoid* has been already described amongst the muscles of the head.

Subclavius (fig. 3, *S*). This is an elongated muscle, like the precoracoidal cartilage to which it is attached. It arises from the ventral surface of the last-named cartilage, and is inserted into the upper part of the crest of the humerus, immediately opposite the summit of the biceps and between the insertions of the pectoralis, deltoid, and trapezius.

Fig. 6.



Deeper flexor muscles of right forearm, the *flexor longus* being cut and reflected
B. Biceps. *C.B.2.* Coraco-brachialis. *F.B.* Flexor brevis. *F.L.* Flexor longus. *P.T.1* & *P.T.2.* Pronator teres. *S.L.* Supinator longus. *Tz.* Triceps.

Coraco-brachialis (figs. 4 & 6, *C.B.*). This muscle consists of two parts.

1. The first part arises from the whole ventral surface of the coracoid, partly covered externally by the pectoralis, and partly appearing superficially between the second part of the pectoralis and *omo-hyoid*. It also arises from the postero-external margin of the coracoid. It is inserted into the humerus, between the implantation of the pectoralis and the origin of the biceps on the one hand, and the upper portion of the second part of the coraco-brachialis on the other.

2. The second portion of the muscle is thick and long. It arises from the posterior margin of the coracoid close behind the glenoid cavity; passing down, it is inserted into the shaft of the humerus to and at the internal condyle.

The *deltoid* (fig. 3, *D*) is a larger muscle than the trapezius. It arises from the outside of the scapula, and is inserted into the crest of the humerus immediately outside and behind the insertion of the *subclavius*.

Subscapularis. A very few and short muscular fibres, passing from just inside the postero-inferior margin of the scapula (close to the glenoid surface) to the adjacent part of the humerus, appear to represent this muscle. These are, however, difficult to distinguish from the adjacent coracoidal part of the triceps.

Biceps (figs. 3, 4, & 6, *B*). This muscle, which is quite single, springs from the tuberosity of the humerus just below the in-

sertion of the subclavius, and is inserted into the upper part of the radius.

Triceps (figs. 3 & 6, *T*). A large muscle arising from the postero-external angle of the coracoid from the outer and inner sides of the shaft of the humerus, and, by direct continuation, from the latissimus dorsi. It is inserted into the proximal part of the ulna.

Fig. 7.



Deeper muscles of extensor surface of right forearm, the *extensor longus* being cut and reflected.

E. B. Extensor brevis. *E. L.* Extensor longus. *P. Q.* Pronator quadratus. *S. L. 1* & *S. L. 2.* Supinator longus. *U.* Ulnaris.

The *supinator longus* (figs. 3, 4, 6, & 7, *S. L.*) appears to be double (*S. L. 1*, and *S. L. 2*, figs. 3 & 7), unless the more internal part (*S. L. 2*) represents an *extensor radialis*. It arises from about the lower third of the humerus, and is inserted into the lower part of the outer (or radial) side of the radius.

Ulnaris (figs. 3 & 7, *U*). This is a rather bulky muscle passing from the distal part of the ulnar side of the humerus downwards to the corresponding side of the carpus.

The *pronator teres* (figs. 4 & 6, *P. T.*) also appears to be double (*P. T. 1* and *P. T. 2*, fig. 6). Both parts extend from the lower end of the inner (or ulnar) border of the humerus, and extend downwards and outwards to the lower part of the radius.

Extensor longus (figs. 3 & 7, *E. L.*). This muscle extends from the outer (or radial) border of the lower part of the humerus, and, expanding as it passes downwards, is inserted into the digits.

Extensor brevis (figs. 3 & 7, *E. B.*). This is a very small muscle which arises from the radial side of the distal end of the ulna, and, passing obliquely downwards and outwards, goes mainly, if not exclusively, to the most radial digit.

Pronator quadratus (?) (fig. 7, *P. Q.*). A small muscle passing from the ulna to the radius, obliquely downwards, and situated between the ulnaris, the inner part of the supinator longus, and the extensor brevis.

Flexor longus (figs. 4 & 6, *F. L.*). This muscle arises from the ulnar side of the lower end of the humerus, and, expanding as it passes downwards, is implanted into the digits.

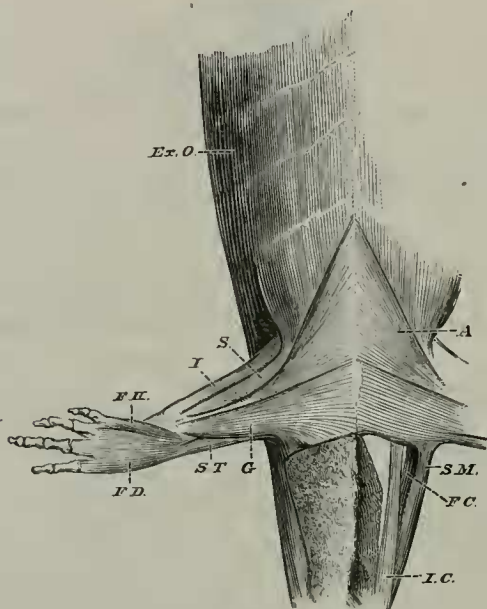
Flexor brevis (fig. 6, *F. B.*). A small subtriangular muscle which

also goes to the digits, but which takes origin from the distal half of the ulna.

Pelvic Limb.

Semimembranosus (figs. 8, 9, 10, & 11, *S. M.*). This slender muscle springs from the hypapophyses of the caudal vertebræ (the first two that are elongated), and passing forwards, enclosed in a sheath consisting of the subcaudal muscular mass, joins the posterior margin of the gracilis and origin of the semitendinosus. It passes along external to the large precloacal glandular mass, and side by side with similarly directed and similar-sized femoro-caudal and ischio-caudal.

Fig. 8.



Superficial muscles of ventral surface of right side.

A. Adductor. *Ex. O.* External oblique. *F. C.* Femoro-caudal. *F. D.* Flexor digitorum. *F. H.* Flexor hallucis. *G.* Gracilis. *I.* Iliacus. *I. C.* Ischio-caudal. *S.* Sartorius. *S. M.* Semimembranosus. *S. T.* Semitendinosus.

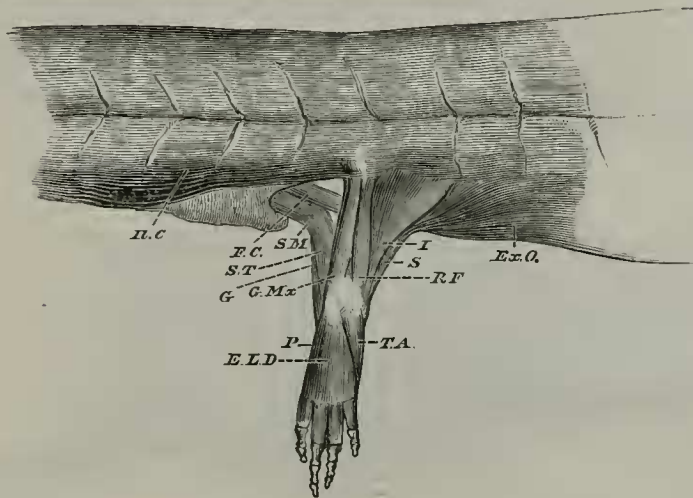
The *ischio-caudal* (figs. 8 & 11, *I. C.*) is the most internal of the caudal appendicular muscles. It arises from the subcaudal muscular mass at the same distance backwards as does the semimembranosus; passing forwards, it is inserted into the postero-external angle of the ischium.

Femoro-caudal (figs. 8, 9, 10, & 11, *F. C.*). This muscle is about the same size as that last described, and also springs from the anterior caudal hypapophyses. It comes out of the sheath formed for it and the muscles running parallel with it by the subcaudal

muscular mass, and, passing forwards, is inserted into the flexor surface of the femur just below the great trochanter, in close contiguity both to the insertion of the adductor and to the origin of the biceps.

The *ilio-caudal* (figs. 9 & 10, *Il. C*) is exceedingly large relatively, and thick, forming the bulk of the lateral caudal muscular mass below the lateral furrow. It is inserted into the whole length of the ilium and its annexed rib.

Fig. 9.



Superficial muscles of dorsal (extensor) surface of right pelvic limb, and of outer side of posterior part of trunk and anterior part of tail.

E. L. D. Extensor longus digitorum. *Ex. O.* External oblique. *F. C.* Femoro-caudal. *G.* Gracilis. *G. M. x.* Gluteus maximus. *I.* Iliacus. *Il. C.* Ilio-caudal. *P.* Peroneus. *R. F.* Rector femoris. *S.* Sartorius. *S. M.* Semimembranosus. *S. T.* Semitendinosus. *T. A.* Tibia's anticus.

Gracilis (figs. 8, 9, 10, 11, & 12, *G*). This muscle arises from the middle (antero-posterior) line of the ventral surface of the pelvic shield. It does not, however, extend forwards for nearly the whole length of this elongated shield, but only as far forwards as a line would be situated which should join the acetabula. It is inserted into the postero-peroneal surface of the upper half of the tibia.

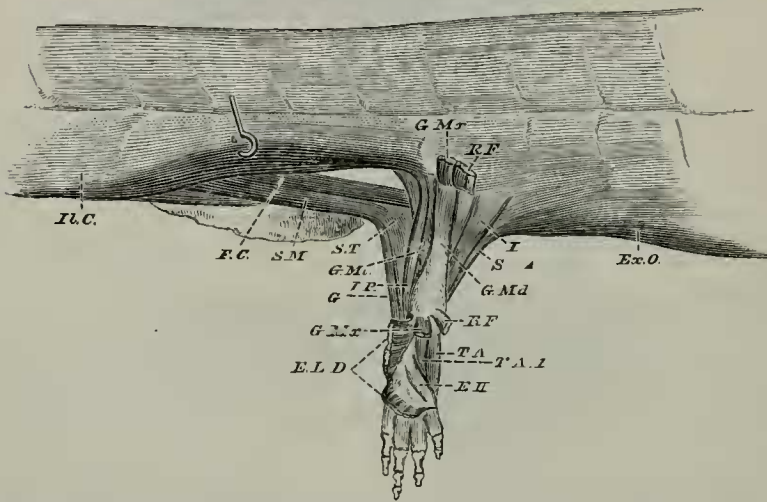
The *adductor* (figs. 8 & 11, *A*) is very much larger than in *Menopoma*, as it springs from the middle of the pelvic shield for its whole length, so that rather more appears superficially in front of the gracilis than is concealed beneath the latter. It is inserted into about the upper half of the flexor surface of the femur between the insertions of the iliacus and femoro-caudal.

Semitendinosus (figs. 8, 9, 10, & 11, *S. T*). This small muscle takes origin from the junction of the semimembranosus with the gracilis, and not from bone or cartilage. Its insertion is the outside of the flexor digitorum, near the pes.

Iliacus (figs. 8, 9, & 10, *I*). Of considerable size, this muscle arises from the internal surface of the antero-external margin of the pubic cartilage. It is inserted into the shaft of the femur from the proximal part of its anterior (extensor) surface down to the tibial condyle.

Sartorius (figs. 8, 9, 10, & 11, *S*). A long slender muscle, which I did not distinguish in *Menopoma*, and which I propose thus to name, arises from the fascia attached to the antero-outer margin of the pelvis, into which fascia fibres of the external oblique are inserted, so that this muscle appears like a continuation downwards of that, *i. e.* of the external oblique. Passing downwards along the inner or tibial margin of the iliacus, it is inserted into the inner side of the upper part of the tibia just above and on the inner (or tibial) side of the insertion of the gracilis.

Fig. 10.



Deeper muscles of outer side of hinder part of trunk and anterior part of tail, and of the dorsal (extensor) side of right pelvic limb—the *gluteus maximus*, *rectus femoris*, and *extensor longus digitorum* being cut and reflected.

E. H. Extensor hallucis. *E. L. D.* Extensor longus digitorum. *Ex. O.* External oblique. *F. C.* Femoro-caudal. *G.* Gracilis. *G. Md.* Gluteus medius. *G. Mi.* Gluteus minimus. *G. Mx.* Gluteus maximus. *I.* Iliacus. *I. C.* Ilio-caudal. *I. P.* Ilio-peroneal. *R. F.* Rectus femoris. *S.* Sartorius. *S. M.* Semimembranosus. *S. T.* Semitendinosus. *T. A.* & *T. A. 1.* Tibialis anticus.

Gluteus maximus (figs. 9 & 10, *G. Mx*). This muscle is very like the one so named by me in *Menopoma*, but it is rather more slender. It springs from the outside of the ilium, and, passing downwards, ends in an aponeurosis, which invests the knee anteriorly and passes to the upper part of the front of the tibia.

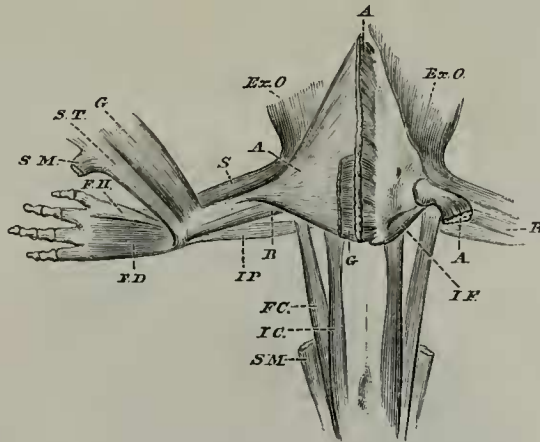
The *rectus femoris* (figs. 9 & 10, *R. F*), very similar in shape

and size to the *gluteus maximus*. Arising from the outer side of the ilium, it passes down beside the last-named muscle, and is inserted by aponeurosis into the inner side of the upper part of the tibia.

Gluteus medius (?) (fig. 10, *G. Md*). Arising from the front of the ilium, this small muscle passes down beside the *iliacus*, and is inserted into the upper part of the outer side of the femur.

Gluteus minimus (?) (fig. 10, *G. Mi*). This little muscular bundle passes from the posterior side of the ilium to the upper half of the posterior side of the shaft of the femur.

Fig. 11.



Deeper muscles of ventral or flexor surface of pelvic limbs, the *gracilis*, *semitendinosus*, and *semimembranosus* being cut and reflected on the right side, and the *adductor* also on the left side.

A. Adductor. *B.* Biceps. *Ex. O.* External oblique. *F. C.* Femoro-caudal. *F. D.* Flexor digitorum. *F. H.* Flexor hallucis. *G.* Gracilis. *I. C.* Ischio-caudal. *I. F.* Ischio-femoral. *I. P.* Ilio-peroneal. *S.* Sartorius. *S. M.* Semimembranosus. *S. T.* Semitendinosus.

Ischio-femoral (fig. 11, *I. F*). A very small muscle (which may perhaps answer to the *quadratus femoris* of higher animals) passes from the postero-external angle of the ischium to the head of the femur very near the acetabulum.

Ilio-peroneal (figs. 10 & 11, *I. P*). A very long and slender muscle arises from the ilium, immediately beneath and closely connected with the *gluteus maximus*. It is inserted into the peroneal side of the fibula above its middle.

The *biceps* (?) (fig. 11, *B*) is also a very slender muscle. It extends from the shaft of the femur, just below the insertion of the femoro-caudal, downwards to the lower part of the fibula.

Tibialis anticus (figs. 9 & 10', *T. A* and *T. A1*). This muscle seems to be double in *Menobanchus*. It arises from the front of the distal end of the femur, and from the proximal parts of the tibia

and fibula. It is inserted into the tarsus and lower part of the tibia on the inner side of the leg. The inner portion (*T. A. 1*) is much like the extensor hallucis of *Menopoma* as to its origin, but it does not appear to descend below the shaft of the tibia.

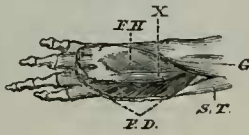
Peroneus (fig. 9, *P*). There is a muscle descending down the outer side of the leg, from the head of the fibula to the tarsus, as in *Menopoma*.

The *extensor longus digitorum* (figs. 9 & 10, *E. L. D*) is a large sheet of muscle covering the front of the leg. It arises by a strong aponeurosis from the front of the distal end of the femur. Passing downwards, it goes to the digits.

Extensor hallucis (?) (fig. 10, *E. H*). A small muscle which I thus name, with doubt and hesitation, takes origin from the lower part of the fibula, and, crossing the limb obliquely, passes to the dorsum of the hallux. Except that this muscle appears only to go to the innermost digit, it has very much the appearance of an extensor brevis digitorum.

Extensor brevis digitorum. This muscle seems to be entirely wanting, unless what I have doubtfully named extensor hallucis be really the extensor brevis.

Fig. 12.



Deepest muscles of ventral or flexor surface of right pelvic limb, the *flexor digitorum* being cut and reflected.

F. D. Flexor digitorum. *F. H.* Flexor hallucis. *G.* Gracilis. *S. T.* Semiten-dinosus. *X.* Tibialis posticus?

Flexor digitorum (figs. 8, 11, & 12, *F. D*). Subtriangular in shape, this muscle takes origin from the posterior surface of the peroneal condyle of the femur; thence expanding as it descends, it goes to the digits.

Flexor hallucis (figs. 8 & 12, *F. H*). Beneath the muscle last described is a muscle which arises from the posterior surface of the fibula and goes mainly, if not entirely, to the most tibial digit.

On the peroneal border of this muscle, between it and the flexor digitorum, a delicate bundle of muscular fibres passes downwards (fig. 12, *X*) to the carpus. It is entirely hidden by the flexor digitorum, so as to be only visible on the removal or reflection of the latter. Is this delicate muscle the representative of the tibialis posticus?

November 11th, 1869.

George Busk, Esq., F.R.S., V.P., in the Chair.

The Secretary read the list of additions to the Menagerie during the past four months, amongst which were particularly noticed:—

1. A Guacharo, or Oil-bird (*Steatornis caripensis*), taken from one of the caves inhabited by these birds in Trinidad, and presented to the Society by the Hon. Arthur Gordon, C.M.Z.S., Governor of the Island (received June 29th). Mr. Gordon had started from Trinidad with six of these singular birds alive; but five of them had died upon the passage, and the present specimen had only survived a few days after reaching the Society's Gardens. Enough had been done, however, to show that it was quite possible, with care and precaution, to bring the Guacharo alive to this country.

2. An example of a species of Macaque Monkey from the Anda-



Macacus andamanensis.

man Islands, obtained at Port Blair, in 1864, by Capt. R. A. Brown, R.N., of H.M.S. 'Vigilant,' and presented to the Society July 8th. This Macaque appeared to resemble most nearly the Pig-tailed Macaque (*Macacus nemestrinus*), and had a somewhat similar tail, but appeared distinguishable by the different arrangement of the hairs on the head. In a notice of the habits of this Monkey in 'Land and Water' for July 24th, 1869, Mr. Bartlett had proposed to call it *M. andamanensis*, which name would stand, if the validity of the species were confirmed by future investigations.

3. A specimen of the Kusimanse, or Mangué (*Crossarchus obscurus*), purchased July 8th, a rare West-African Carnivore, which had not been exhibited in the Society's Menagerie since the year 1834*.

4. Six Amherst's Pheasants (*Thaumalea amherstiae*), deposited by Mr. J. J. Stone, F.Z.S., July 16th.

After many unavailing efforts, Mr. Stone had succeeded in adding this magnificent Pheasant to the list of introduced species. Unfortunately, only one female survived to reach this country,—the rest being males, adult or in change of plumage. The female of the Amherst's Pheasant was previously unknown, but turned out, as might have been anticipated, to resemble nearly the corresponding sex in the Gold Pheasant (*Thaumalea picta*). Mr. Stone had received these birds from his correspondent in Hankow; but Mr. Selater had been informed by Mr. Swinhoe that they had been originally obtained for him by a French missionary priest resident at Ta-kien-lieou, at the foot of the Yung-ling mountains, in the further part of the province of Setchuen. The range of this bird was thus proved to extend from the Burmese frontier of Yunan (where it was obtained by Dr. Anderson†) into the province of Setchuen.

5. An Owen's Apteryx (*Apteryx owenii*), presented by the Acclimatization Society of Otago, New Zealand, and received July 28th, being the first example of this species received alive in Europe.

6. A White-bellied Stork (*Ciconia abdimii*), obtained by purchase July 29th, being the first example of this rare species exhibited alive in the Society's Menagerie.

7. A young pair of the recently discovered Long-tailed Deer of Northern China (*Elaphurus davidianus*), presented to the Society by H.E. Sir Rutherford Alcock, K.C.B., H.B.M. Ambassador at the Court of Peking.

The expected arrival of a pair of this remarkable animal had already been announced (P. Z. S. 1868, pp. 210, 530). A coloured figure of them and complete account would be given in a paper on the Deer living in the Society's Gardens, which was now being prepared for publication in the Society's 'Transactions.'

8. A Pleurodele Newt (*Pleurodeles waltii*), obtained in the vicinity of Seville in Spain, and presented to the Society by Lord Lilford, F.Z.S., August 13th.

* See Mr. Martin's notice of the dissection of a specimen of this animal, P. Z. S. 1834, p. 113.

† See Dr. Anderson's letters, *antéa*, pp. 111 et 278.

9. A specimen of the Potto (*Perodicticus potto*), purchased September 4th.



Perodicticus potto.

This rare Lemurine form had only been once before exhibited in the Society's Gardens, in 1848*.

10. A fine young male of the Spanish Ibez (*Capra hispanica*), from the Sierra Hermosura, in Southern Spain, presented to the Society by Major Howard Irby, of the 74th Highlanders, September 4th. Unfortunately, the female of this species from the same locality, presented by the same generous donor in August 1868†, had died; but several correspondents of the Society were on the look out for examples of this animal, so that there were fair prospects of its becoming ultimately a permanent denizen of the Society's Gardens.

11. Three Island-Hen Gallinules, from Tristan d'Acunha (*Gallinula nesiotis*, Sclater, P. Z. S. 1861, p. 260, pl. xxx.), presented by E. L. Layard, Esq., F.Z.S., September 3rd.

12. A superb Crested Eagle (*Spizaëtus ornatus*), from Costa Rica, presented by Capt. J. M. Dow, F.Z.S., and received September 27th, being the second example of this fine bird of prey exhibited in the Society's Gardens.

* See Report of the Council for 1849, p. 15. Cf. also Mr. Skues's notes, *anteâ*, p. 1.

† See P. Z. S. 1868, p. 526.

The following extracts were read from a letter addressed to Mr. Grote, F.Z.S., by Dr. J. Anderson, C.M.Z.S., dated Indian Museum, Calcutta, June 11th, 1869:—

“I dare say you will remember that I made various futile attempts while you were in Calcutta to procure living specimens of the Pigmy Hog of the Terai (*Porcula salvania*). On these occasions I trusted to the kind promises of some of my friends in the neighbourhood of Darjeeling; but as they all failed in their uneducated endeavours, I sent my own collectors last March to the Terai to try what they could do. I am glad to say they have been successful, and I have now a fine specimen of this remarkable little Hog before me while I write. It is a young male, but the natives assert that it is nearly full-grown. It measures 19 inches along the side, from the tip of the snout to the vent, and the tail is 21 lines in length. Jerdon is in error when he says that it has no mane; for my specimen has a marked list of long black hairs down the back, intermixed with yellowish-brown hairs, and with others banded with the latter colour and black. The hairs over the rump are longer than in any other part of the body. The sides are sparsely covered with bright yellow-brown hairs, and with others banded like those on the dorsum. The mesial line of the ventral surface, from between the fore legs to the vent, is almost nude, with only a few short yellow hairs. The legs are very graceful, and suggest that this elegant little creature must test the running-qualities of the dogs. The ears are full and round. The snout is moderately long, but not so tapering as in the common Boar. Mr. Southby, of the Selim Tea-Estate, under whose care my collectors were, informs me that *Porcula salvania* is common in the Terai below Punkahlari, and is found in herds of 500 in the low jungle. The natives inform him that its food consists of bulbs and roots; and that the female carries her brood, which usually numbers three or four, for five or six months. It is very shy, and the Mechies trap it with nets and hunt it with dogs. A village will catch as many as four or five in a season, which they reckon from January to April; and when caught young it becomes easily domesticated, and is found tame about the villages. These wild people consider its flesh a great delicacy.

“I have also been trying hard to get skins, skeletons, and living specimens of the Yākin (*Budorcas taxicolor*). I have within the last month received two very fine skins of half-grown males, with small straight horns directed backwards. The Mishnees brought one of the specimens alive nearly as far as Debrooghur. This was in answer to the reward I had offered of one hundred rupees for a living specimen. I am afraid I shall not succeed in getting the beast alive to the plains, as it lives among the snow, being seldom seen below it. Major Stewart informs me that the Yākin is found in all the high ranges to the north-east of Debrooghur, and is far from uncommon. The Mishnees, with their very inferior appliances to shoot and catch them, are nevertheless frequently dressed in their skins, or have a part of a skin with the hair on as an ornament, which would seem to indicate that they are numerous. The Mish-

nees between the Brahmapootra and the Dihong say that the full-grown ones are so fierce that it would be impossible to bring them alive to Debrooghur. They are seen in pairs, and sometimes in herds of twenty or more. They are swift of foot and good climbers. Why Jerdon should have excluded this interesting animal from the Indian fauna is a puzzle to me; for it is quite as Himalayan as the Brown Bear and the Musk-deer, both of which are included in his book."

The following extracts were read from a letter addressed to the Secretary by Dr. George Bennett, F.Z.S., dated Sydney, June 15th, 1869:—

"The Government steamer 'Thetis' having been sent to Lord Howe's Island to investigate a case of homicide, among other gentlemen interested in natural history, Mr. R. D. Fitzgerald, of the Surveyor-General's department, obtained leave to visit the island. To this gentleman I am indebted for the following information, more especially for the interesting account of the habits of the 'Wood-hen,' a species of Rail now becoming rapidly extinct, peculiar to Lord Howe's Island. The 'Thetis' left Sydney on the 26th of May, arrived on the 29th, and returned to Sydney on the 7th of June, 1869. The island is situated in lat. 31° 30' S., and long. 159° E. It is sixteen miles in circumference, 6½ miles in length, and averages about half a mile in width. The inhabitants are about thirty-five, including children. The produce of the island is maize, onions, potatoes, and bananas; the soil is rich, and the vegetation very luxuriant, among which palms, tree ferns, and the banyan fig are most conspicuous. Pigs and Goats run wild on the island, the former feeding principally upon the fruit of the palms.

"Among the birds collected by Mr. Fitzgerald, I recognized specimens of *Merula vinitincta*, *Zosterops strenuus*, *Chalcophaps chrysochlora*, and *Pachycephala gutturalis*. The most interesting bird procured, and of which only one was obtained, was the 'Wood-hen.' I recollect that in the year 1836 or 1837 the late Alexander Macleay, then Colonial Secretary of New South Wales, had several of these birds alive, which had been brought to him from Lord Howe's Island; and he at that time expressed an intention of sending them to the Linnean and Zoological Societies, but I am not aware whether they ever reached their destination. The White Gallinule, figured in Phillips's 'Voyage to Botany Bay,' and found only in Norfolk and Lord Howe's Islands, is now extinct, as it is not seen at either of those islands. Mr. Fitzgerald, in the account he gave me, says, 'The land birds are not numerous, probably not more than of twelve or thirteen distinct species. I observed:—a little Green Pigeon; a Blackbird, having leaf-tossing habits and call-notes of that class of birds; a *Zosterops*, or Silver-eye (of larger size than the species common about Sydney); a *Pachycephala*, or Thick-head, having the colonial appellation of "Doctor;" a *Rhipidura*, or Fly-catcher (similar to our Sydney species); a little *Acanthiza*; and a *Pachycephala* with black and yellow plumage, seemingly identical with *P. gutturalis*; a species of Kingfisher; a Crow-Shrike (*Strepera*

graculina?), and the "Wood-hen." The last-named bird reminded me of a "Corn-crake." It is said that there was formerly a large Pigeon on the island, now extinct. A Red-tailed Tropic Bird (*Phaëton phœnicurus*) was procured; but the oceanic birds, as far as noticed, were the same as those usually inhabiting the Australian seas. The "Wood-hen" is very peculiar in its habits, and the observations I made are as follows:—When ascending the mountain the guide stopped suddenly, as a note like two rasps of a saw was heard at some distance among the loose stones and ferns, and exclaimed "That is a Wood-hen." He then imitated the note of the bird, and the Wood-hen replied. He again tried the imitation, but the bird was silent. Another guide accompanying us then struck the back of the tomahawk against a tree; again the bird answered; further strokes of the tomahawk were useless, no reply could be obtained. Then a dog was made to bark, and with effect; the call of the bird was again heard, and again and again as often as the sounds were made and varied. At each time it was apparent that the bird was approaching nearer and nearer to our position, until the bird ran out, apparently quite confused and bewildered, close to our feet. The dog that accompanied us, and which had been kept back, was then set at liberty; he seized the bird and immediately killed it; otherwise it might have been captured alive. It was mentioned that had the dog been kept back and stones thrown at the bird, it would, on being merely grazed by one, retreat but show itself again immediately. It appears that the noise made to attract the bird must be constantly varied, one continuous sound having no effect; chorus or scraps of songs, crowing of a cock, or any other noise with which the "Wood-hen" is unacquainted will attract its attention and draw the bird towards you; and the guide stated that even if a gun was fired all the "Wood-hens" within hearing would show themselves. This being so, no wonder they are becoming scarce, and will, no doubt, be soon extinct.' "

In reference to this letter, Mr. P. L. Sclater exhibited a stuffed specimen of the so-called "Wood-hen," which had been mounted from an example in spirits transmitted by Dr. Bennett to the Royal College of Surgeons. Mr. Sclater stated that, as suggested in the letter, the bird was evidently a Rail of the genus *Ocydromus*, but apparently of a new species, for which he proposed the name

OCYDROMUS SYLVESTRIS, sp. nov. (Plate XXXV.)

Oleagineo-fuscus fere unicolor, subtus vix dilutior, capitis lateribus et gutture cineraceo paulum lavatis: remigibus rufis nigro anguste transfasciatis: rostro et pedibus obscure corneis: long. tota 11·0, alæ 5·2, caudæ 2·2, rostri a rictu 2·0, tarsi 2·0.

Hab. in insula "Lord Howe" dicta, maris Australiani.

Remarks.—This *Ocydromus* is readily distinguishable from *O. australis* and *O. earlei* of New Zealand by its small size, and by the rufous colour of the wings, which are narrowly banded across with black. Besides the New-Zealand species, the only other member of this genus known to me is the *O. lufresnayanus* of New Caledonia,



$\frac{1}{2}$

J. Smit. del.

OCYDROMUS SYLVESTRIS

M. & N. Hartbert. imp.

